

REMARKS

Applicants note that the Office Action Summary indicates in the Disposition of the Claims that claims 1-33, 45 and 46 stand rejected. However, the detailed Office Action does not provide the reasons for or the legal authority under which claim 33 stands rejected. *See*, Office Action, pp. 2-4. Applicant does hereby provide a response to the Office Action to the fullest extent possible, and requests that claim 33 be referred to in the next communication from the United States Patent and Trademark Office indicating its status and grounds for its status. This claim was rejected in the final Office Action dated October 25, 2000, only under 35 U.S.C. § 112 ¶ 2. This ground for rejection has not been re-asserted, it is therefore assumed to be overcome, and no other ground for rejecting this claim has been given.

Applicants submit this Amendment "D" and Response for the Examiner's consideration. Reexamination and reconsideration of the application, in view of the following remarks are respectfully requested.

1. STATUS OF THE CLAIMS

Claims 1-33 and 45-46 were presented for examination. Claims 1-32 and 45-46 stand rejected under 35 U.S.C. § 103(a). These rejections are traversed below.

2. RESPONSE TO REJECTIONS

2.1. Claim Rejections Under 35 U.S.C. § 103(a)

Claims 1-32 and 45-46 stand rejected under 35 U.S.C. § 103(a) either in view of the combination of Japanese Patent 62-48028 (hereinafter "JP'028") and Wolf, vol. 1, pp. 323-24 (hereinafter "Wolf") (claims 1-6, 11-19, 45-46, 20-21, and 24-31) or in view of this combination

together with Japanese Patent 63-300526 (hereinafter "JP'526") (claims 7-10, 22-23, and 32). English translations of JP'028 and JP'526 are part of the record, and thus cites to and quotes from these patents are given below without providing additional copies of these translations.

The Office Action indicates that the rejection of claims 1-6, 11, 13-17, 20-21, 24, 26, 29-31, and 45-46 is maintained as stated in the paper mailed 10/25/00 (hereinafter "Paper 10/25/00").

It is agreed that neither JP'028 nor Wolf discloses bombarding an exposed region of a semiconductor material. See, Paper 10/25/00, p. 3, third paragraph and beginning of fourth paragraph. Therefore, these references do not satisfy the condition that "the prior art reference or references must teach or suggest all the claim limitations" which is one of the criteria that must be satisfied to establish a *prima facie* case of obviousness. M.P.E.P. §§ 2142-43, p. 2100-97 (Rev. 1, Feb. 2000).

Paper 10/25/00 further asserts: (a) that "[i]t would have been within the scope of one of ordinary skill in the art to remove the oxide layer of Japan '028 in the event that the effects disclosed by Wolf are not desired to be obtained", and (b) that the characterization of the scope of one of ordinary skill in the art made in (a) is "in view of the disclosure of Japan '028 figures 2A-2D that field oxide formation is suitably performed after removal of the pad oxide layer 2a in the field region." Paper 10/25/00, p. 3, fourth full paragraph, last four lines. These assertions are respectfully traversed below by first addressing (b) and subsequently addressing (a).

Regarding assertion (b), the description in JP'028 does not support the assertion that "field oxide formation is suitably performed after removal of the pad oxide layer 2a in the field region". JP'028 discloses each and every step that involves the removal of a material layer other than pad oxide layer 2a, but it does not disclose any method step in which pad oxide layer 2a is removed prior to field oxide formation. Quite the contrary, JP'028 discloses a process that relies on the presence

of pad oxide layer 2a. Furthermore, JP'028 teaches away from field oxide formation without such layer because JP'028 discloses that warpage, deterioration and current leaks derive from oxide formation without such layer.

Ion implantation according to JP'028 is performed through a silicon dioxide film on the substrate's field region (*see* Translation JP'028, p. 4, fourth full paragraph, lines 1-2, 4) and the implanted silicon ions "penetrated silicon dioxide film 2b to form implant defect 6" (*see* Translation JP'028, p. 4, fourth full paragraph, lines 7-9). JP'028 proceeds by disclosing that "[t]hen, as in Figure 1(c), we peeled off implant mask 4 and, using silicon nitride film 3a as a mask, did wet oxidation ... to form field oxide film 7." Translation JP'028, p. 4, fifth full paragraph, lines 1-3. Figure 1(c) in JP'028 shows field oxide regions 7 that have been formed by wet oxidation and these regions are shown in this figure interconnected by layers between the silicon nitride film 3a and substrate 1. Although not every feature in Figure 1(c) in JP'028 is labelled, these interconnecting layers are in the same locations as pad oxide layer 2a, thus further supporting that field oxide formation as disclosed in JP'028 is not performed after removal of pad oxide layer 2a. Therefore, ion implantation to form oxide film 7/7a as disclosed in JP'028 differs from the bombarding recited in the present claims because ion implantation in JP'028 relies on the presence of a silicon dioxide film through which ion implantation takes place. In addition, oxidizing the material exposed to the ions as disclosed in the implantation method of JP'028 also differs from the oxidizing the material in the exposed region as recited in the present claims because oxidizing according to JP'028 is not performed on an exposed region but while the silicon oxide film is present.

In contrast with the assertion in Paper 10/25/00, JP'028 in Figures 2(a)-2(d) does not disclose that "field oxide formation is *suitably* performed after removal of the pad oxide layer 2a in the field region." (*Italicization added*) Paper 10/25/00, p. 3, fourth full paragraph, last two lines. Figures

2(a)-2(d) in JP'028 are used to illustrate the description therein of LOCOS. Regarding this technique, JP'028 indicates in the section entitled "Problems with Current Technology" that "thermal stresses [are] created by differences in thermal expansion rates between the silicon substrate and field oxidized film", and that "differences in thermal expansion rates between the silicon substrate and the field oxidized film cause[] stress on the substrate or results in defects and dislocations arising in the substrate", thus leading to warping, deterioration, and current leaks. Translation JP'028, p. 3, second and third full paragraphs. Rather than describing a suitable performance of field oxide formation without pad oxide layer 2a in the field region, it is submitted that this disclosure in JP'028 strongly teaches away from forming field oxide without pad oxide layer 2a in the field region.

Regarding assertion (a), Wolf discloses reasons for implanting ions through surface layers. Wolf does not teach or suggest the recited steps that include bombarding an exposed region with no surface layers. It does not follow from Wolf or any other cited reference that bombarding the exposed region as recited in the present claims will successfully accomplish the effects of the presently claimed methods. In fact, as noted above, JP'028 discloses that oxidizing without at least a surface layer will lead to detrimental effects such as warping, deterioration and current leaks.

Paper 10/25/00 asserts that "to remove the oxide layer of Japan '028 in the event that the effects disclosed by Wolf are not desired to be obtained" would have been within the scope of one of ordinary skill in the art. Paper 10/25/00, p. 3, fourth paragraph, lines 2-3. Applicants respectfully point out that the "desired results" that may be achieved by modifying a prior art reference are limited only to the teaching, suggestion, or motivation provided by the prior art reference or by the knowledge generally available to one skilled in the art. Hindsight provided by Applicants' disclosure may not supply the motivation to modify the teachings of Wolf. To this respect, neither Wolf nor JP'028 teach or suggest the presently recited methods that include the ion bombardment of an

exposed region (contrary to the disclosure in JP'028 and the reasons and their implications given in Wolf) and the oxidation of the exposed region (in contrast with the disclosure in JP'028 and its teachings to the contrary).

The Office Action characterizes functions of the oxide layer as purportedly not retained by the present invention without citing or providing any support for such assertions and somehow implying that the only way for retaining such functions is to form an oxide layer. For example, the Office Action asserts that prevention of contamination by an oxide layer is not retained in the present invention. *See* Office Action, p. 3, first full paragraph. Applicants respectfully traverse these assertions and request that, to the extent that they are intended to be re-asserted, they be accompanied with supportive cites. The present claims recite a method for forming an oxide region on a substrate assembly. As shown above, the claimed methods do not rely on the conventional steps that are taught by the cited references. Furthermore, it is also shown above that the claimed methods include at least one step that is taught against in one of the cited references. Even if, *arguendo*, the methods taught in the cited references were capable of forming the same structure with the same final characteristics, then the claimed methods would accomplish such results by omitting conventional steps.

Applicants incorporate herein the reasoning, cites and quotes set forth with respect to the rejections under 35 U.S.C. § 103(a) in Amendment "C" and Response filed January 25, 2001. As shown hereinabove and in the incorporated material, the three references that are cited in the context of the rejections under 35 U.S.C. § 103(a) teach as follows: (1) JP'028 discloses an implantation step that is different from the bombarding recited in the present claims; JP'028 discloses an oxidation step that is different from the oxidation recited in the present claims; and JP'028 teaches away from the oxidation recited in the present claims; (2) Wolf discloses reasons and some of their

implications for an implantation step that is not recited in the present claims; and (3) JP'056 does not provide any basis that would overcome the limitations set forth with respect to JP'028 and Wolf. Accordingly, even if these references were combinable, it is respectfully submitted that they may not establish a *prima facie* case of obviousness with respect to the present claims.

Consequently, Applicants respectfully request the reconsideration and withdrawal of this rejection.

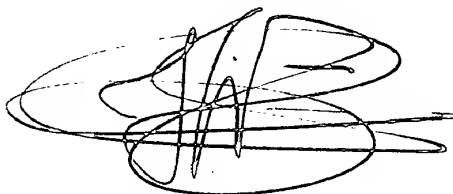
3. CONCLUSIONS

In view of the above, Applicants respectfully maintain that the present application is in condition for allowance. Reconsideration of the rejections is requested. Allowance of claims 1-33 and 45-46 at an early date is solicited.

In the event that the Examiner finds any remaining impediment to a prompt allowance of this application which could be clarified by a telephonic interview, or which is susceptible to being overcome by means of an Examiner's Amendment, the Examiner is respectfully requested to initiate the same with the undersigned attorney.

Dated this 13th day of June 2001.

Respectfully submitted,

A handwritten signature in black ink, appearing to read 'Jesús Juanós i Timoneda', enclosed within a large, loopy oval shape.

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